

ASAP
Work Order ID 94309

94309

Page 1

December-06-12 11:48:22 AM

Item ID: D3177-041

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Bracket

Stop

NS2

Start Date: 12/06/12 Start Qty: 2.00

2

Cust Item ID:

Required Date: 12/13/12 Req'd Qty: 2.00

2

Customer:

Reference:

Approvals:

Process Plan: *✓*

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr								
D3177	Rev B2	0.00							
100 *100* Bandsaw	BAND SAW	0.00							
	Memo	0.00							
	Cut blank: 47.40" x (12.000" +0.100/-0.000)								
			<i>JL 12-12-10</i>						
110 *110* HAAS 1	HAAS CNC VERTICAL MACHINING #1	0.00	<i>P0</i>	<i>12-12-16</i>	<i>Z Ø</i>				
HAAS CNC vertical machine #1	Memo	0.00							
	1-Machine part as per Folio FA291 and Dwg D31772-Deburr								
120 *120* QC	QC2- Inspect parts off machine FAI/FAIB	0.00	<i>P0</i>	<i>12-12-17</i>	<i>Z Ø</i>				
Quality Control	Memo	0.00							

[Signature]

Work Order ID 94309

December-06-12 11:48:22 AM

94309

Page 3

Item ID: D3177-041

Accept

N900040100

Setup

Start

NS1

Revision ID:

Item Name: Bracket

Stop

NS2

Start Date: 12/06/12 Start Qty: 2.00

2

Cust Item ID:

Required Date: 12/13/12 Req'd Qty: 2.00

2

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

160

160

Powdercoat

Powder Coating

White Gloss(Ref.4.3.5.1) per QSI005 4.3-Alum

M123383

0.00

2 φ 13-1-14

Memo

0.00

START TIME:

1:05

OVEN TEMPERATURE:

300

1:35.

170

170

QC

Quality Control

QC3- Inspect Part Finish

0.00

2x

EJ 13/01/15

Memo

0.00

180

180

Small Fab

Small Fab

Small Fab

0.00

Memo

0.00

Assemble as per Dwg D3177

2x

EJ 13/01/15

Work Order ID 94309***94309***

Page 4

December-06-12 11:48:22 AM

Item ID:	D3177-041	Accept	*N900040100*	Setup	Start	*NS1*	
Revision ID:							
Item Name:	Bracket					Stop	*NS2*
Start Date:	12/06/12	Start Qty: 2.00	*2*	Cust Item ID:			
Required Date:	12/13/12	Req'd Qty: 2.00	*2*	Customer:			
Reference:							
Approvals:	Process Plan: _____	Date: _____	Tooling: _____	Date: _____	Run	Start	*NR1*
	QC: _____	Date: _____	SPC (Y/N): _____	Date: _____	Stop		*NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190 *190* QC Quality Control	QC5- Inspect part completeness to step on W/O Memo	0.00 0.00	AS 15 89 13.1.15			2			
200 *200* Packaging Packaging	Identify as per dwg & Stock Location: Memo	ST/166 0.00 0.00				2x			SP 13-01-18
210 *210* QC Quality Control	QC21- Final Inspection - Work Order Release Memo	0.00 0.00							13/1/14 JJ 13-01-18

13-01-18

Picklist Print

December-06-12 11:48:21 AM

Page 1
10

Work Order ID: 94309

Parent Item: D3177-041

Parent Item Name: Bracket

Start Date: 12/06/12

Required Date: 12/13/12

Start Qty: 2.00

Required Qty: 2.00

Comments: IPP Rev:B03.01.27Added Step 12KJ/RF

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

AN960JD10 Washer	NAS1149D0363J <i>4D</i>	Purchased <i>1122378</i>	No <i>6x</i>			180	Each	0.0000	3	6	<i>PS 13/01/15</i>	
BLRS-010 Pip Pin		Purchased	No			180	Each	36.0000	1	2	<i>PS 13/01/15</i>	

D2690-6 Lanyard Assembly	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			FG	4		
			121374	4		
			ST283	32		
			118207	1		
			120178	2		
			122730	29		

D2690-6RevB2 Lanyard Assembly	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			GA	3		
			91957	3		
			ST014	27		
			90568	2		
			91642	1		
			92559	4		
			92739	6		
			92867	4		
			93401	10		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3177-5 Spacer	Manufactured	No	<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>	<i>2</i>
			ST032	13		
			<u>20295</u>	<u>13</u>		

D3065-5DART AEROSPACE LTD	Work Order:	<i>94509</i>
Description: Bracket	Part Number:	D3177-1
Inspection Dwg: D3177 Rev: B2		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

X First Article Prototype

Measured by:	P0	Audited by:	H.A. 08	Prototype Approval:	N/A
Date:	12-12-17	Date:	12/12/21	Date:	N/A

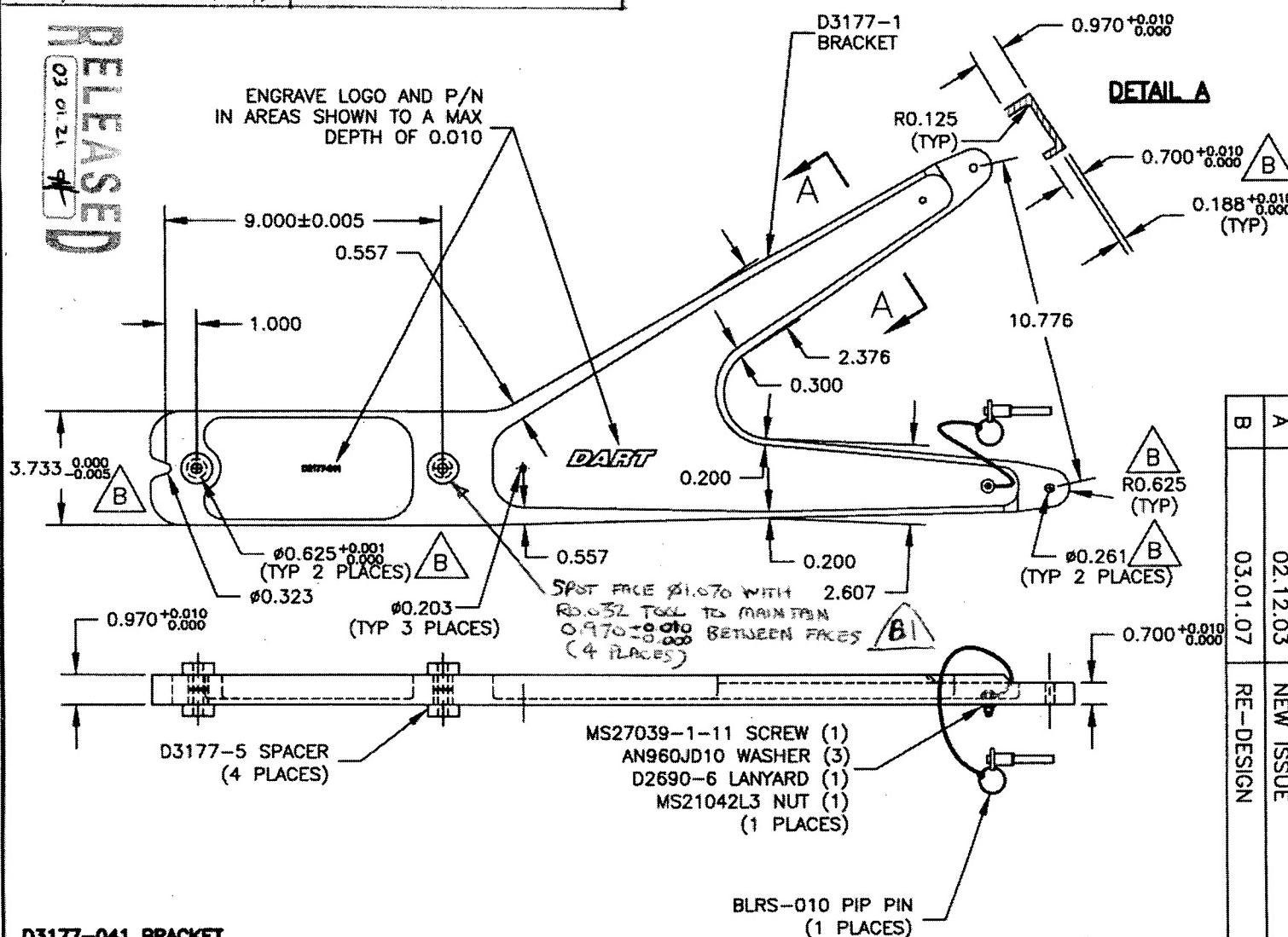
Rev	Date	Change	Revised by	Approved
A	04.02.25	New Issue P/O D3177-041/-043	KJ/RF	JF

جولہ

THIS D	B1	03.02.25	OP #	ADD SANT FACE
	B2	03.11.24	OP #	ADD D3177-7



ENgrave logo and P/N
in areas shown to a max
depth of 0.010



D3177-041 BRACKET

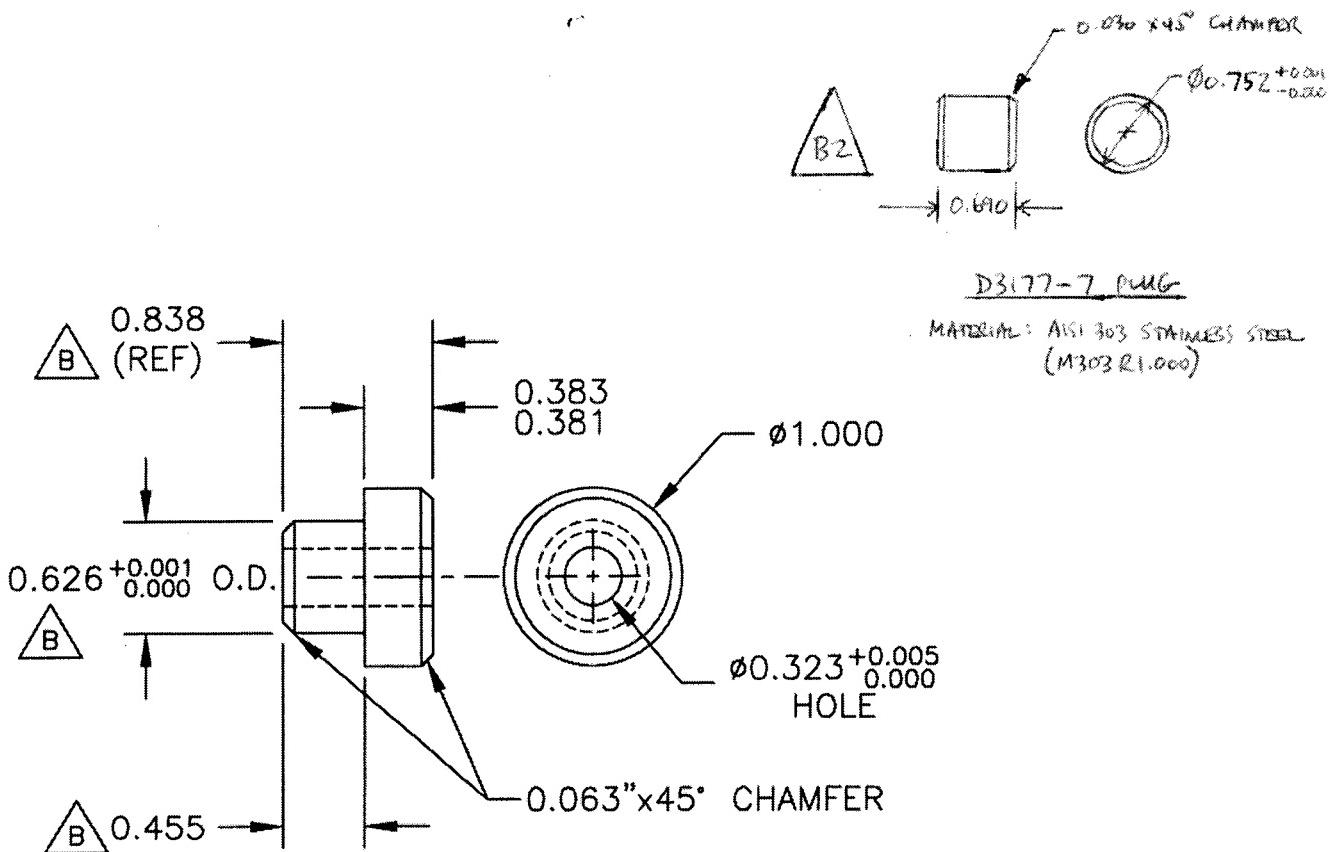
- 1) MACHINE D3177-1 PER DART DWG "D3177-1.SLDPRT"
MATERIAL: 6061-T6 ALUMINUM BAR (QQ-A-250/11 OR QQ-A-200/8)
(REF DART SPEC. M6061T6S OR M6061T6B)
 - 2) BREAK ALL SHARP EDGES 0.005 TO 0.015
 - 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 (PRIOR TO ASSEMBLY)
POWDER COAT WHITE (4.3.5.1) PER DART QSI 005 4.3 (AFTER ASSEMBLY)
 - 4) TOLERANCES ARE PER QSI 018 UNLESS OTHERWISE NOTED
 - 5) ALL DIMENSIONS ARE IN INCHES



DRAWN BY		DART AEROSPACE LTD	
UNDRAWN BY		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. B
		D3177	SHEET 1 OF 3
APPROVED		TITLE	SCALE
		BRACKET	1:5
DATE			
03.01.07		NEW ISSUE	
A	02.12.03		
B	03.01.07	RE-DESIGN	

DART

DESIGN	CP	DRAWN BY	CP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA
CHECKED	#	APPROVED	#	DRAWING NO. D3177
DATE	03.01.07			REV. B SHEET 3 OF 3 TITLE SCALE 1:1 BRACKET

**D3177-5**

- 1) MATERIAL: 6061-T6 ALUMINUM BAR Ø1.000
(QQ-A-200/8 OR QQ-A-225/8)
(REF DART SPEC. M6061T6R1.000)
- 2) BREAK ALL SHARP EDGES 0.005 TO 0.010
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
- 4) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 5) ALL DIMENSIONS ARE IN INCHES

RELEASED
03.01.21 #

Copyright © 2002 by DART AEROSPACE LTD

THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.

NCR: Yes / No

DQA: _____ Date: _____

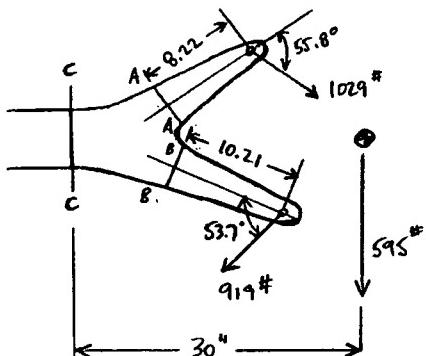
WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order:	94309				DISPOSITION	AGAINST DEPARTMENT/PROCESS																																							
Part No.					Rework <input type="checkbox"/>	Skid-tube <input type="checkbox"/>	Crosstube <input type="checkbox"/>	Water Jet <input type="checkbox"/>	Engineering <input type="checkbox"/>																																				
NCR No.					Scrap <input type="checkbox"/>	Machining <input checked="" type="checkbox"/>	Small Fab <input type="checkbox"/>	Prod. Eng. Coor. <input type="checkbox"/>	Quality <input type="checkbox"/>																																				
					Use-as-is <input checked="" type="checkbox"/>	Thermoforming <input type="checkbox"/>	Finishing <input type="checkbox"/>	Rec/Store/Packaging <input type="checkbox"/>	Other <input type="checkbox"/>																																				
					Work Order Update <input type="checkbox"/>	Large Fab <input type="checkbox"/>	Composite <input type="checkbox"/>	Supplier <input type="checkbox"/>																																					
Root Cause	Date	Step	Qty	Description of work order update or Non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector																																				
Doc/Data	12-12-17	110	1	The Two Leg step dim of .700 is under tolerance of .006. Reason: wrong tool was used Qty 1	DAS 12 0.89 12/1/21	Acceptable. margins of safety are still positive per SR-D130-701 Rev A	PD 12-12-17																																						
Equip/Tooling			2	The Thickness of the wall on one leg of .200 is .192 due to imperfection in Blank material Qty 2 parts	DAS 12 0.89 12/1/21	Acceptable. Moment of inertia of section is larger than that analyzed in SR-D130-701-1 Rev A	DAS 12 0.89 12/1/21	12/1/21	DAS 16 0.89 12/1/21																																				
FAULT CATEGORY																																													
Landing Gear	<table border="1"> <thead> <tr> <th colspan="3">General</th> </tr> </thead> <tbody> <tr><td>Bending</td><td>Bend</td><td>Grain</td></tr> <tr><td>Centre Not Concentric to O/S</td><td>BOM/Route</td><td>Hardware</td></tr> <tr><td>Cracks</td><td>Broken/Damaged</td><td>Inspection Incomplete</td></tr> <tr><td>Crushed/Crimped</td><td>Burrs</td><td>Instructions Incomplete/Unclear</td></tr> <tr><td>Cuffs</td><td>Contamination</td><td>Maintenance</td></tr> <tr><td>Heat Treat</td><td>Countersink</td><td>Mislabeled</td></tr> <tr><td>Inspection Strip in Tube</td><td>Cut Too Short</td><td>Misread</td></tr> <tr><td>Ripples in Bend</td><td>Drill Holes</td><td>Offset</td></tr> <tr><td>Torque Waves in Extrusion</td><td>Drawing</td><td>Out of Calibration</td></tr> <tr><td>Turning Sequence</td><td>Finish</td><td>Out of Sequence</td></tr> <tr><td>Wave/Twist in Tube</td><td>Folio</td><td>Outside Dimensions</td></tr> </tbody> </table>									General			Bending	Bend	Grain	Centre Not Concentric to O/S	BOM/Route	Hardware	Cracks	Broken/Damaged	Inspection Incomplete	Crushed/Crimped	Burrs	Instructions Incomplete/Unclear	Cuffs	Contamination	Maintenance	Heat Treat	Countersink	Mislabeled	Inspection Strip in Tube	Cut Too Short	Misread	Ripples in Bend	Drill Holes	Offset	Torque Waves in Extrusion	Drawing	Out of Calibration	Turning Sequence	Finish	Out of Sequence	Wave/Twist in Tube	Folio	Outside Dimensions
General																																													
Bending	Bend	Grain																																											
Centre Not Concentric to O/S	BOM/Route	Hardware																																											
Cracks	Broken/Damaged	Inspection Incomplete																																											
Crushed/Crimped	Burrs	Instructions Incomplete/Unclear																																											
Cuffs	Contamination	Maintenance																																											
Heat Treat	Countersink	Mislabeled																																											
Inspection Strip in Tube	Cut Too Short	Misread																																											
Ripples in Bend	Drill Holes	Offset																																											
Torque Waves in Extrusion	Drawing	Out of Calibration																																											
Turning Sequence	Finish	Out of Sequence																																											
Wave/Twist in Tube	Folio	Outside Dimensions																																											
									Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled																																				
									Other																																				
									Acc -1 - operator error																																				
									Acc -2 - material																																				

DESIGN	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO.	REV. A SR-D130-701-1 SHEET 6 OF 9
DATE	02.11.26	TITLE	SCALE STRESS REPORT NTS

6.2 AFT BRACKET (D3177-043)



SECTION A-A

$$\text{FROM } F_z : M_{A-A} = (1029 \#)(1.5) \cos(90^\circ - 55.8^\circ)(8.22") \\ = 10494 \text{ in-lb}$$

$$\text{FROM } F_x : M_{A-A} = (196 \#)(1.5)/2 \times 8.22" = 1208 \text{ in-lb}$$

SECTION B-B

$$\text{FROM } F_z : M_{B-B} = (919 \#)(1.5) \cos(90 - 53.7^\circ)(10.21") \\ = 11343 \text{ in-lb}$$

$$\text{From } F_x : M_{B-B} = (196 \#)(1.5)/2 \times 10.21" = 1500 \text{ in-lb}$$

SECTION C-C

AT THIS SECTION, D3177-041 IS WORST CASE AND THE MOMENTS WILL BE THE SAME.

6.3 MARGINS SUMMARY

Part	Section	Direction	(M)max (in lb)	Fcy/Ftu (psi)	I (in^4)	<u>Actual</u>		(M)all (in lb)	MS
						<u>c</u> \downarrow	<u>c</u> (in)		
D3177-041	A-A	Z	13791	34000	0.642	1.28	17053	0.24	
D3177-041	A-A	X	1419	34000	0.056	0.67	2842	1.00	
D3177-041	B-B	Z	8497	34000	0.665	1.38	16384	0.93	
D3177-041	B-B	X	1357	34000	0.0430	0.72	2031	0.50	
D3177-041	C-C	Z	26775	34000	3.178	1.87	57782	1.16	
*D3177-041	C-C	X	5880	34000	0.145	0.60	8217	0.40	
*D3177-041	C-C	X	8820	38000	0.145	0.60	9183	0.04	
D3177-043	A-A	Z	10494	34000	0.731	1.43	17380	0.66	
D3177-043	A-A	X	1208	34000	0.044	0.72	2078	0.72	
D3177-043	B-B	Z	11343	34000	0.441	1.18	12761	0.12	
D3177-043	B-B	X	1500	34000	0.042	0.71	2020	0.35	

* THE ABOVE TABLE SHOWS ULTIMATE LOADS TO YIELD PROPERTIES, EXCEPT FOR SECTION C-C, WHERE BOTH THE LIMIT + ULTIMATE CALCULATIONS HAVE BEEN DONE TO DEMONSTRATE POSITIVE MARGINS.

CP 12/12/21

7.1 Fastener Analysis

<u>Location</u>	<u>Load</u>	<u>Type</u>	<u>E</u>	<u>n</u>	<u>1.15*1.5*F/n</u>	<u>Fmax</u>	<u>MS</u>
1	Double Shear	AN4	1029	1	1775	7360	3.15
2	Double Shear	MS17984C5	2645	1	4563	14400	2.16
3	Double Shear	AN5	2050	1	3536	11500	2.25
4	Tensile	AN3	1758	4	758	3130	3.13
5	Double Shear	MS17984C5	1758	1	3033	14400	3.75

7.2 Limit Bearing Analysis

<u>Location</u>	<u>Part</u>	<u>Material</u>	<u>E</u>	<u>n</u>	<u>1.15*F/n</u>	<u>D</u>	<u>t</u>	<u>e/D</u>	<u>Fbry</u>	<u>Fb</u>	<u>MS</u>
1	D3172-041	AISI 304/316 SS	1029	2	592	0.250	0.063	>2.0	55000	866	0.46
→ 1	D3177-041/-043	6061-T6	1029	1	1183	0.250	0.694	>2.0	60000	10410	7.80
2	D3177-041/-043	6061-T6	2645	1	3042	0.313	0.970	>2.0	60000	18217	4.99
2	D3173-041	6061-T6	2645	2	1521	0.313	0.125	>2.0	60000	2348	0.54
3	D3177-041/-043	6061-T6	2050	1	2358	0.313	0.970	>2.0	60000	18217	6.73
3	D3173-041	6061-T6	2050	2	1179	0.313	0.125	>2.0	60000	2348	0.99
5	D3175-041	6061-T6	1758	2	1011	0.313	0.125	1.24	39960	1563	0.55

7.3 Ultimate Bearing Analysis

<u>Location</u>	<u>Part</u>	<u>Material</u>	<u>E</u>	<u>n</u>	<u>1.15*1.5*F/n</u>	<u>D</u>	<u>t</u>	<u>e/D</u>	<u>Fbru</u>	<u>Fb</u>	<u>MS</u>
1	D3172-041	AISI 304/316 SS	1029	2	888	0.250	0.063	>2.0	162000	2552	1.87
→ 1	D3177-041/-043	6061-T6	1029	1	1775	0.250	0.694	>2.0	82000	14227	7.02
2	D3177-041/-043	6061-T6	2645	1	4563	0.313	0.970	>2.0	82000	24896	4.46
2	D3173-041	6061-T6	2645	2	2281	0.313	0.125	>2.0	82000	3208	0.41
3	D3177-041/-043	6061-T6	2050	1	3536	0.313	0.970	>2.0	82000	24896	6.04
3	D3173-041	6061-T6	2050	2	1768	0.313	0.125	>2.0	82000	3208	0.81
5	D3175-041	6061-T6	1758	2	1516	0.313	0.125	1.24	47360	1853	0.22

7.4 Limit Shear Analysis

<u>Location</u>	<u>Part</u>	<u>Material</u>	<u>E</u>	<u>n</u>	<u>1.15*F/n</u>	<u>e</u>	<u>t</u>	<u>Fsy</u>	<u>Fs</u>	<u>MS</u>
1	D3172-041	AISI 304/316 SS	1029	2	592	0.621	0.063	15753	1233	1.08
→ 1	D3177-041/-043	6061-T6	1029	1	1183	0.561	0.694	23263	18114	14.31
5	D3175-041	6061-T6	1758	2	1011	0.242	0.125	23263	1407	0.39

7.5 Ultimate Shear Analysis

<u>Location</u>	<u>Part</u>	<u>Material</u>	<u>E</u>	<u>n</u>	<u>1.5*1.15*F/n</u>	<u>e</u>	<u>t</u>	<u>Fsu</u>	<u>Fs</u>	<u>MS</u>
1	D3172-041	AISI 304/316 SS	1029	2	888	0.621	0.063	55000	4304	3.85
→ 1	D3177-041/-043	6061-T6	1029	1	1775	0.561	0.694	26000	20245	10.41
5	D3175-041	6061-T6	1758	2	1516	0.242	0.125	26000	1573	0.04

Margins are positive with 1/8 thickness
of 0.694. → Acceptable (P, 12/12/21)